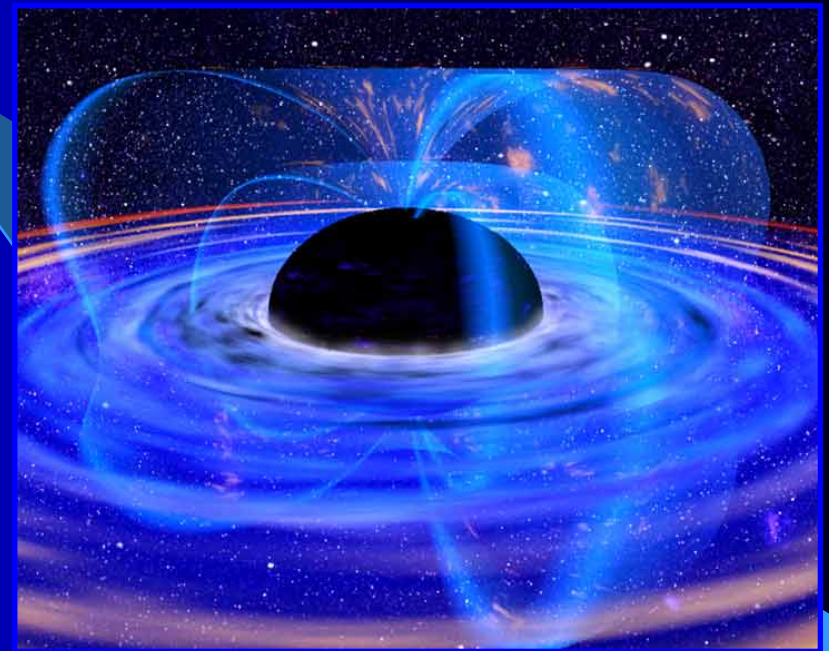


# Detectability of redshifted iron line features in AGN

**Chris Reynolds**

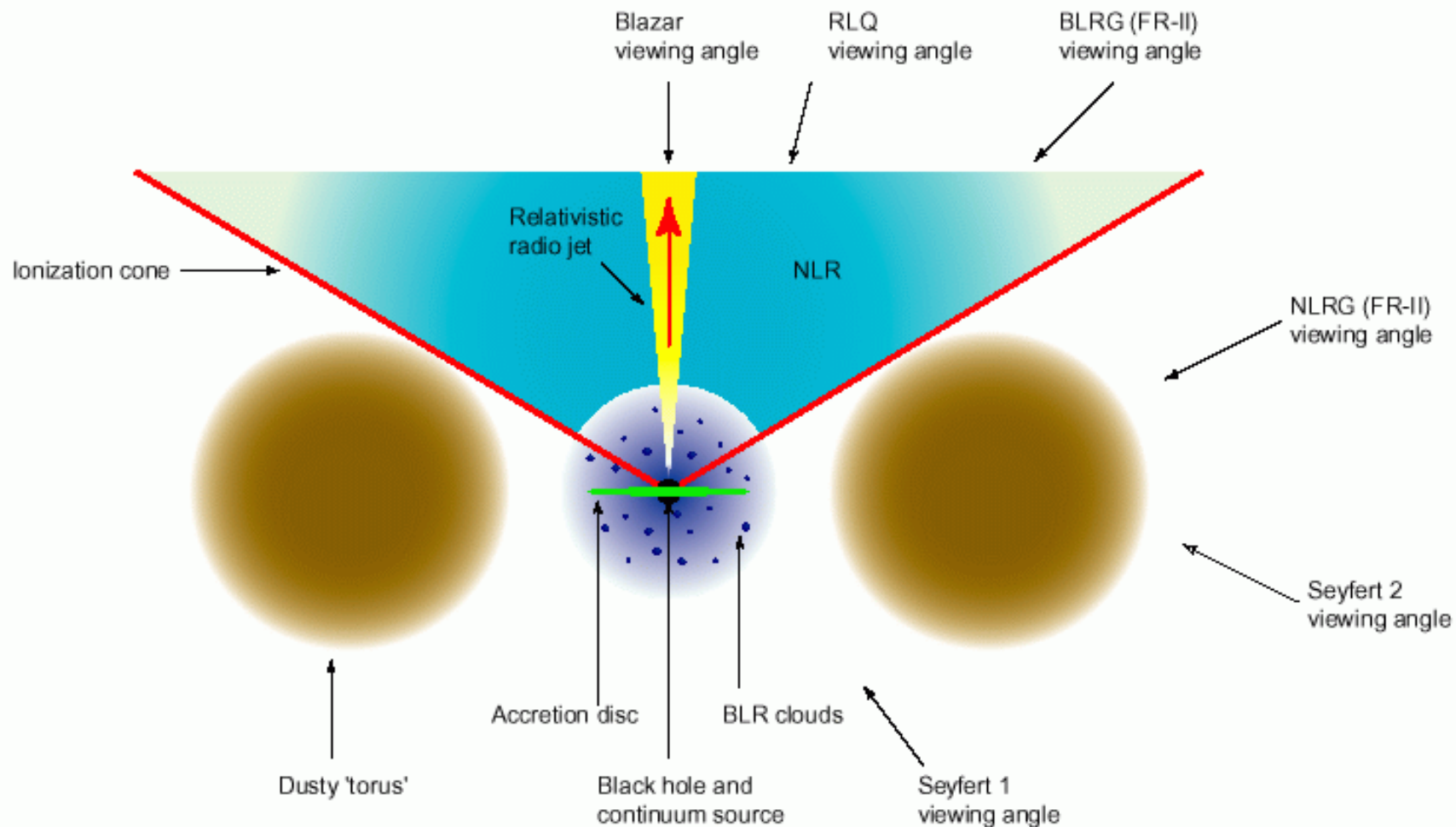
Department of Astronomy  
University of Maryland



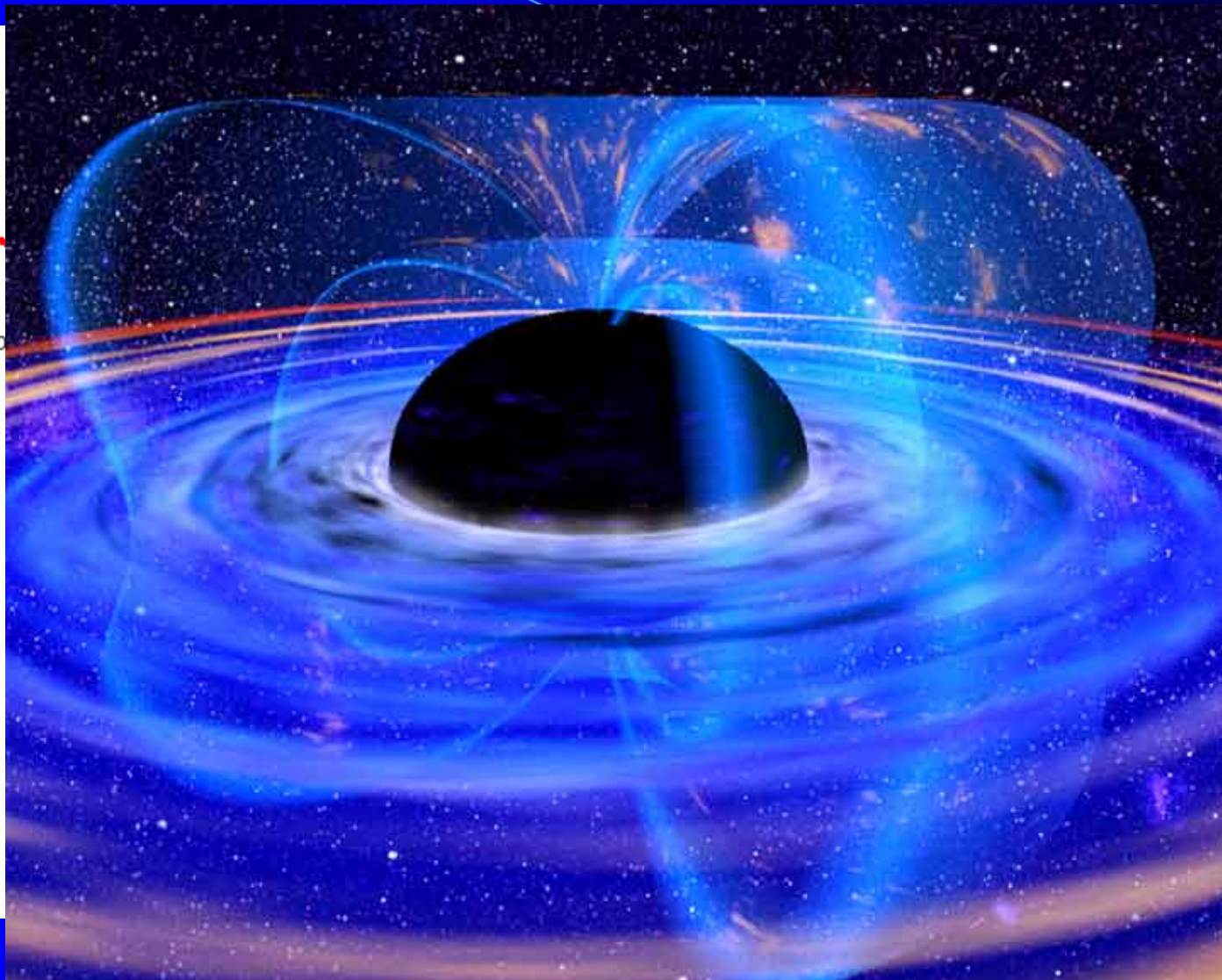
Constellation-X FST meeting  
15th February 2006

# Outline

- The importance and diagnostic power of iron line spectroscopy in black hole systems
  - Detailed sensitivity calculations and simulations
- **The take-home messages...**
  - Constellation-X will pioneer investigations of spacetime geometry in accreting black hole systems
  - There are specific diagnostics that are within reach of the baseline Constellation-X design
  - Future trade-off studies... important to preserve (or extend) effective area in 4-6keV band
- A note on a new probe of AGN Feedback...



Ionization co

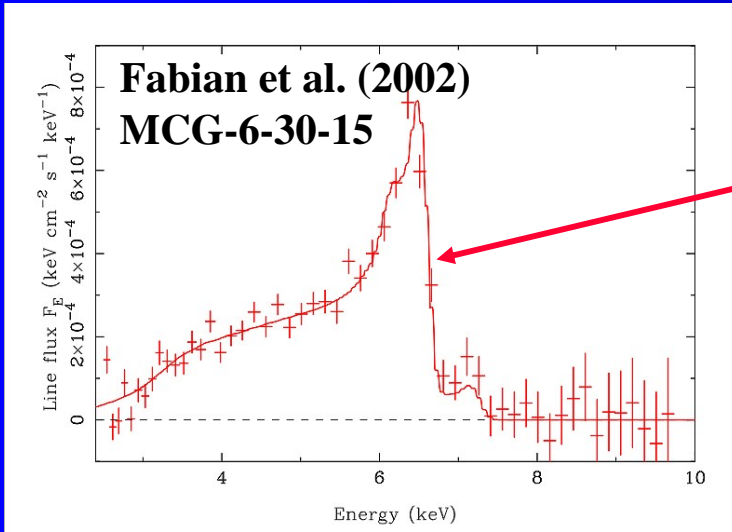


RG (FR-II)  
wing angle

eyfert 2  
wing angle

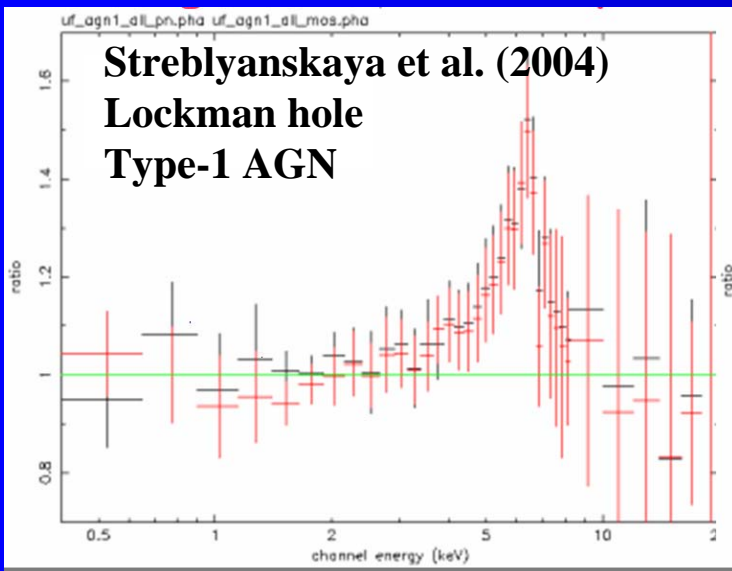
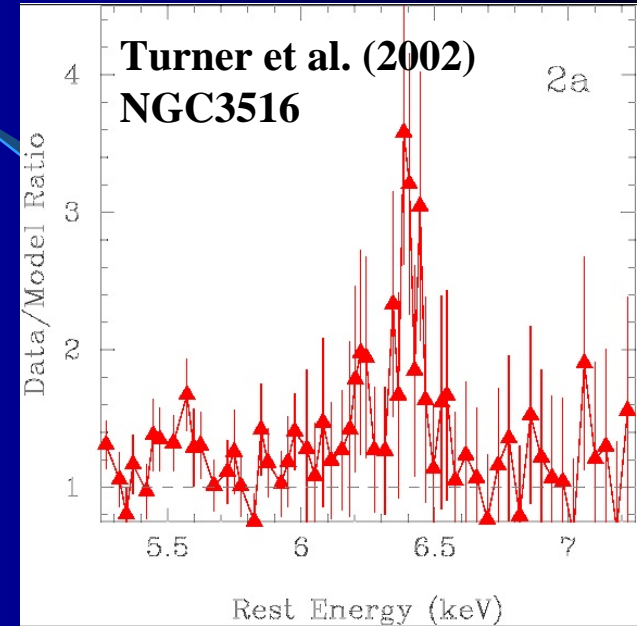


# Where are we now?

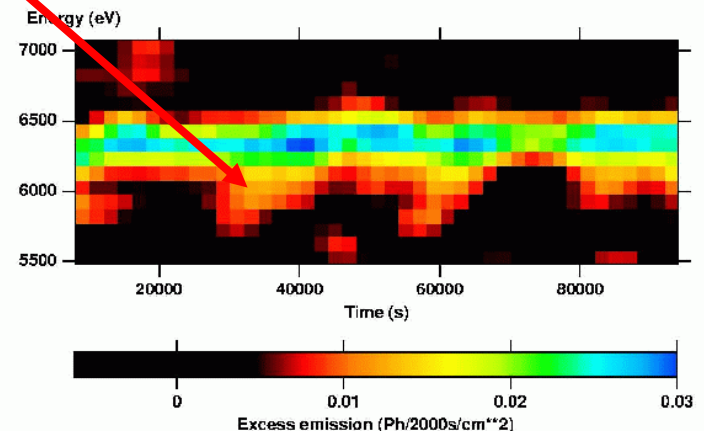


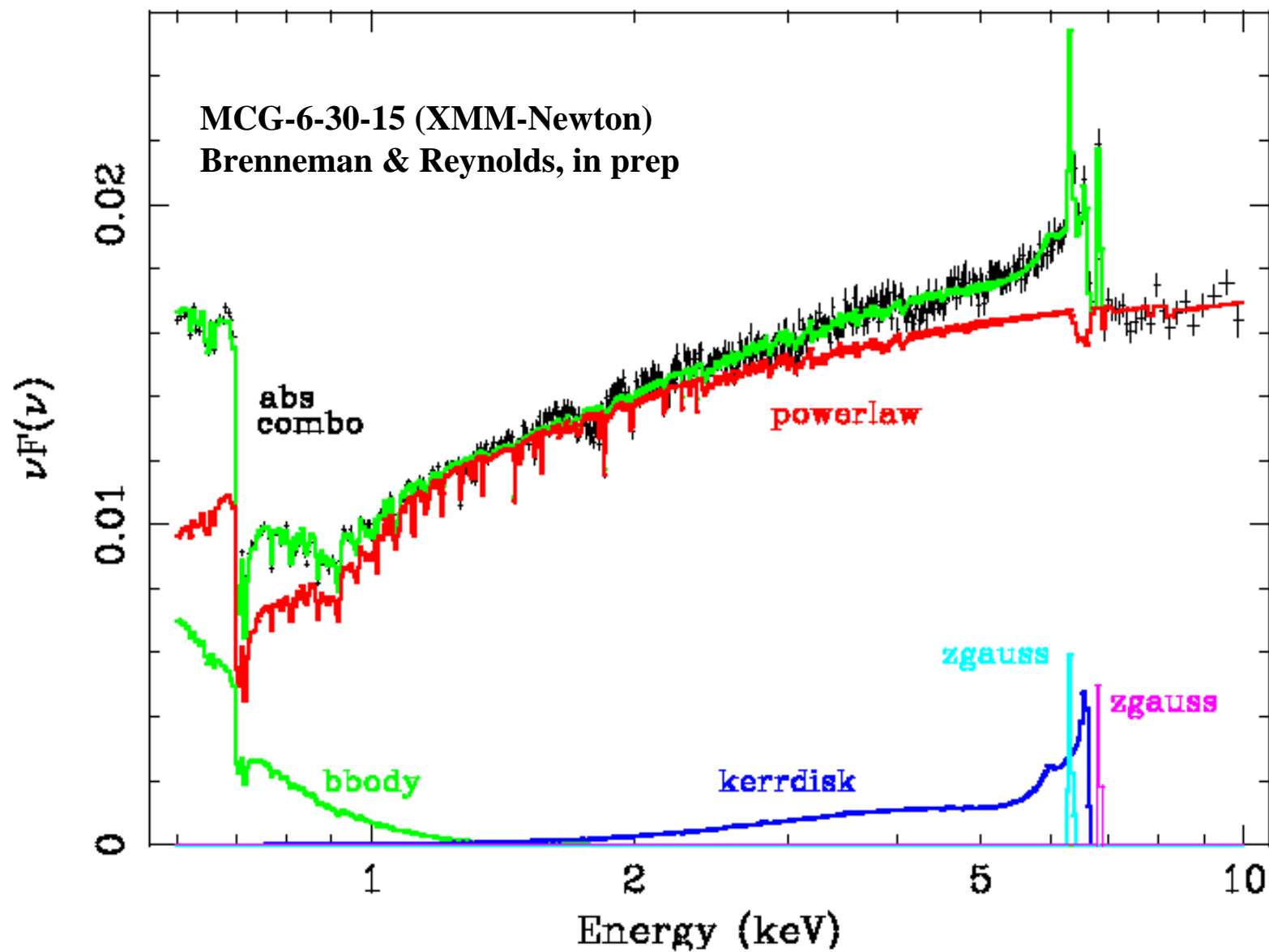
Broad iron lines  
from accretion  
disk ( $r \sim 2GM/c^2$ )  
around rapidly  
spinning black  
holes

Lines from  
orbiting hotspots  
at  $r \sim 20GM/c^2$



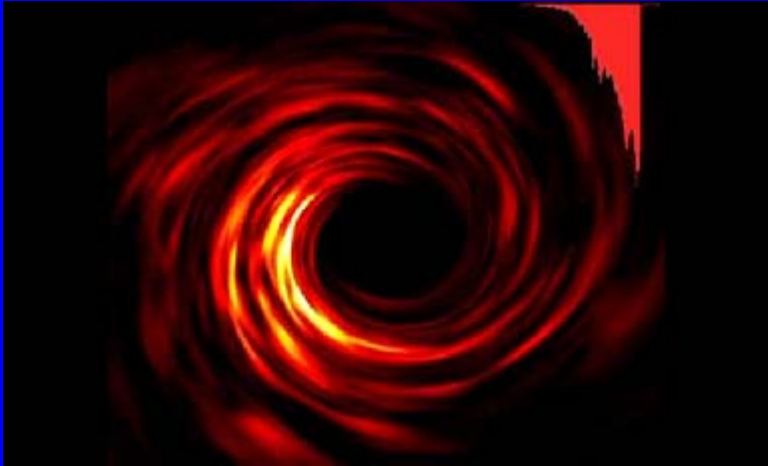
**Iwasawa et al. (2004); NGC3516**



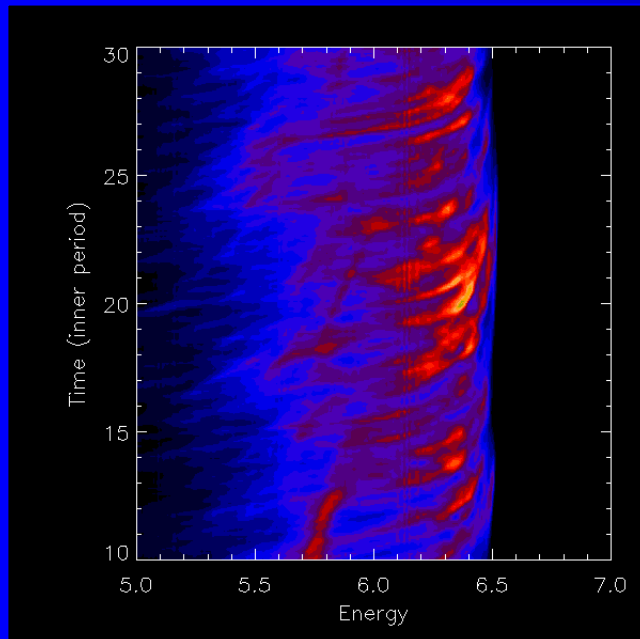


# The next step : Constellation-X

Click picture to play



Click picture to play

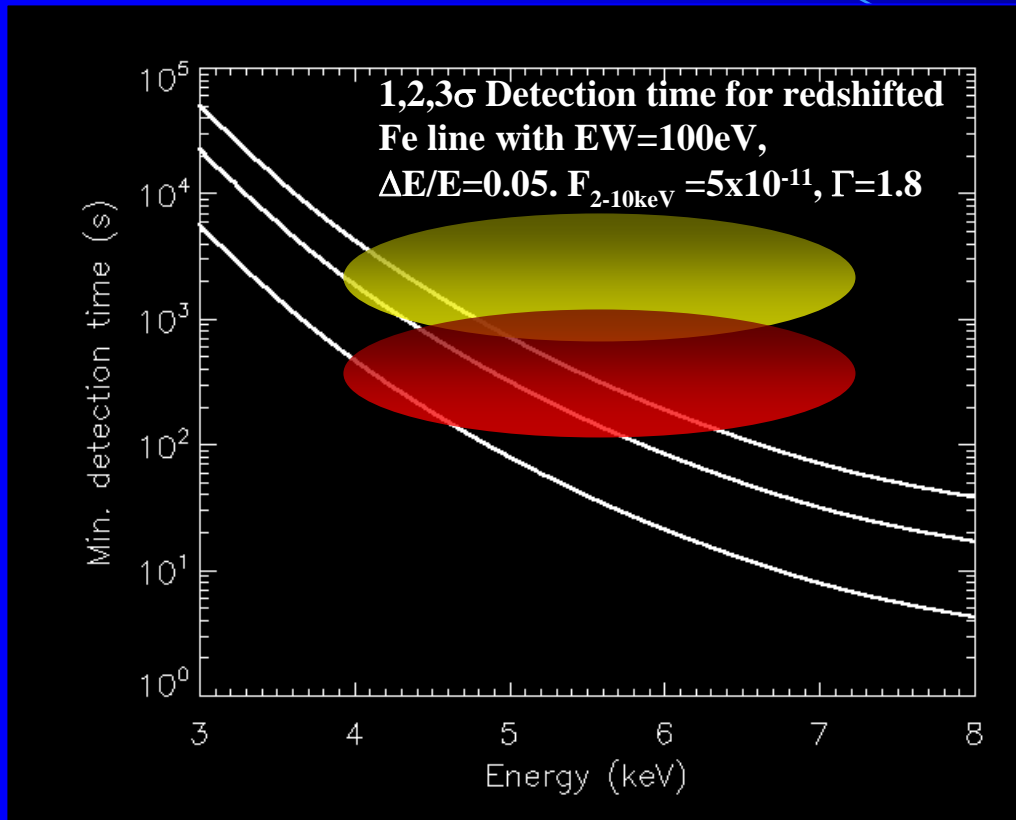


**Analysis of iron line variability (from orbital motion of disk & reverberation effects) allows to to separate effects of**

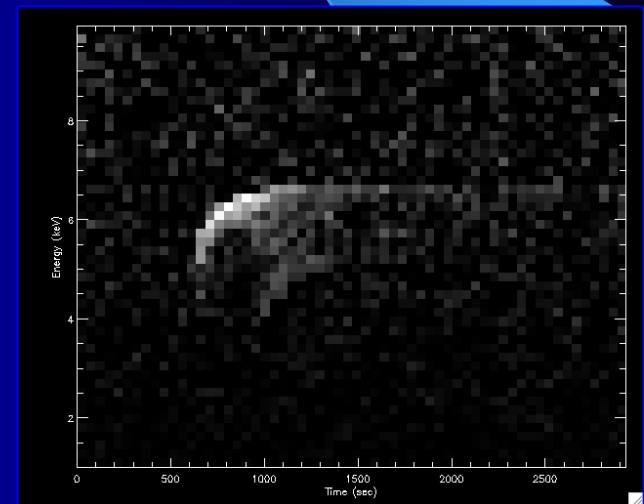
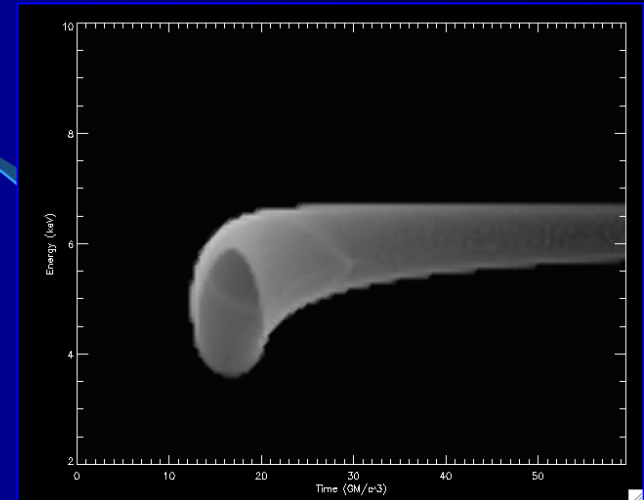
- **Accretion disk physics**
- **Spacetime geometry**

**Requires superior collecting area of Constellation-X**

# Detectability with Constellation-X



Ellipses give an indication for ability of Constellation-X to detect orbital variability (yellow region) and reverberation effects (red region).

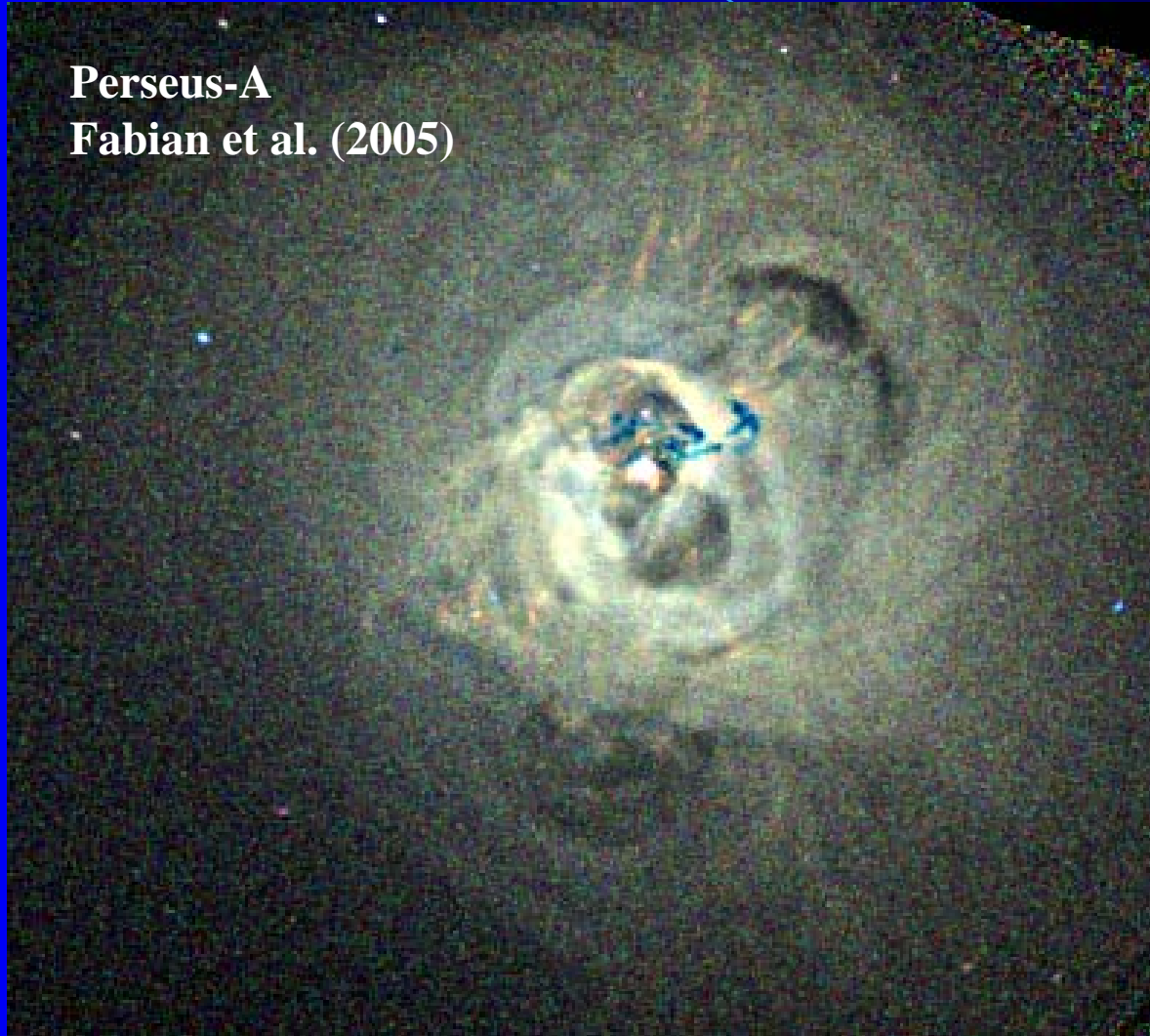


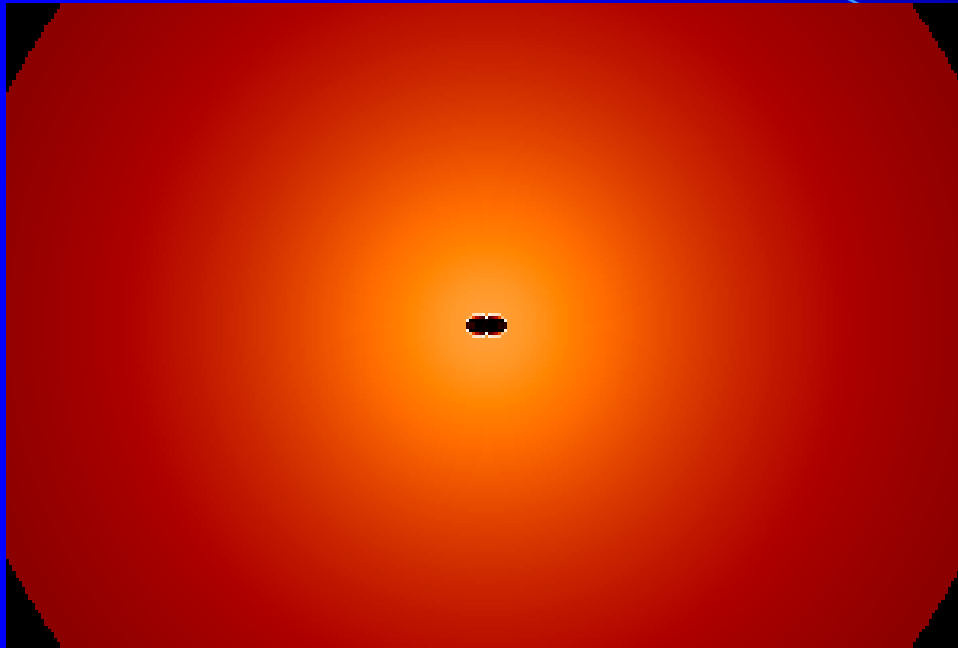


# Summary of strong gravity probes

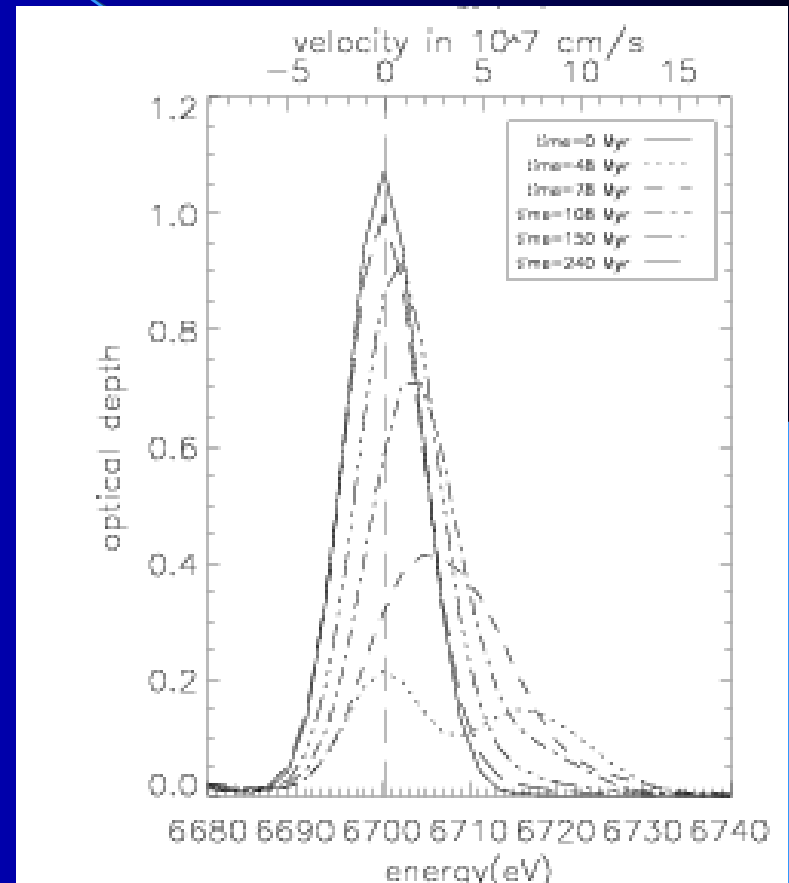
- Strong gravity component of Constellation-X science case still compelling
- S/N calculations backed by simulations demonstrate feasibility of iron line variability science
- Demonstrate need to preserve effective area in the 4-6keV band in any future trade studies.

# Epilogue: iron absorption lines as probe of AGN/ICM interaction





**Probe dynamics of AGN/ICM interaction  
through ICM absorption lines... readily open  
to Constellation-X**



**Koeckert & Reynolds (2006)**

**200ks Constellation-X simulation**  
**[Flux & slope of 3C120 assumed]**

normalized counts/sec/keV

